

AMENDMENTS TO THE CLAIMS

This Listing of Claims will replace all prior versions, and listings, of claims in this application:

Listing of Claims:

1. (Currently Amended) A device for conducting processing steps on a substrate comprising an array of chemical compounds on a surface thereof, said device comprising:
 - (a) a housing comprising a housing chamber configured to retain any fluid introduced into said housing chamber, said fluid having a meniscus,
 - (b) an opening in said housing adapted for insertion into said housing chamber of a substrate having a surface comprising an array of chemical compounds into said housing chamber,
 - (c) a fluid separation mechanism for separating configured to separate fluid in said housing chamber from contact with said substrate in a controlled manner so that preserves the integrity of the fluid meniscus at the atmosphere-fluid interface is preserved,
 - (d) at least one inlet in fluid communication with said housing chamber, and
 - (e) at least one outlet in fluid communication with said housing chamber.

2. (Original) A device according to claim 1 further comprising a tilt mechanism for controlling the orientation of said device.

3. (Currently Amended) A device according to claim 1 wherein said fluid separation mechanism is a lifting mechanism for lifting said substrate out of contact with said fluid in a said controlled manner.

4. (Currently Amended) A device according to claim 3 wherein said lifting mechanism lifts said substrate out of said housing chamber in a said controlled manner at a rate that substantially eliminates droplet formation of said fluid on said substrate.

5. (Currently Amended) A device according to claim 1 wherein said fluid separation mechanism is a fluid removal mechanism for removing fluid from said housing chamber in a said controlled manner.

6. (Currently Amended) A device according to claim 5 wherein said fluid removal mechanism removes fluid from said housing chamber in a said controlled manner at a rate that substantially eliminates droplet formation of said fluid on said substrate.

7. (Currently Amended) A device according to claim 5 wherein said fluid

removal mechanism lifts said substrate out of said housing chamber in a said controlled manner at a rate that substantially eliminates droplet formation of said fluid on said substrate.

8. (Original) A device according to claim 5 wherein said fluid removal mechanism comprises a valve or a pump.

9. (Original) A device according to claim 8 wherein said fluid removal mechanism comprises a valve having a varying cross-section relative to height of fluid in said housing chamber.

10. (Original) A device according to claim 8 wherein said fluid removal mechanism comprises a pump having a constant displacement.

11. (Original) A device according to claim 1 further comprising a temperature controller.

12. (Currently Amended) A device according to claim 1 further comprising a separator mechanism for separating configured to separate a sandwich of a substrate and a cover slide inserted into said housing chamber.

13. (Currently Amended) A device according to claim 12 wherein said separator mechanism comprises a pair of flexible members having a wedge member therebetween.

14. (Original) A device according to claim 1 further comprising a means for cooling a fluid.

15. (Original) A device according to claim 1 further comprising a heat exchanger for heating and/or cooling a fluid.

16. (Original) A device according to claim 1 further comprising a solvent vapor generator.

17. (Currently Amended) A device according to claim 1 further comprising wherein said housing chamber comprises a said substrate positioned within said housing chamber, said substrate comprising a chemical array on the surface thereof.

18. (Original) A device according to claim 17 wherein said chemical array is a biopolymer array.

19-28. (Canceled).

29. (Currently Amended) A method for performing a step of a hybridization reaction on the surface of a substrate, said method comprising:

- (a) inserting a substrate comprising an array of chemical compounds on a surface thereof into a housing chamber of a device according to claim 1,
- (b) introducing a fluid reagent for performing said step into said housing chamber, and
- (c) removing said fluid reagent from contact with said substrate in a controlled manner at a rate that substantially eliminates ~~droplet~~ formation of droplets of said fluid on said surface of said substrate.

30. (Original) A method according to claim 29 wherein said step is washing said surface and/or drying said surface.

31. (Currently Amended) A method according to claim 29 wherein said removing is carried out by lifting said substrate from said housing in a said controlled manner.

32. (Original) A method according to claim 29 wherein said removing is carried out by a removal mechanism selected from the group consisting of (i) a valve having a varying cross-section relative to height of fluid in said housing chamber and (ii) a pump

having a constant displacement.

33. (Original) A method according to claim 29 further comprising introducing a fluid vapor into said housing chamber during said removing to assist in drying said substrate surface.

34. (Original) A method according to claim 33 wherein said fluid vapor is a vapor of an organic solvent.

35. (Original) A method according to claim 29 further comprising tilting said device during said removing.

36. (Original) A method according to claim 29 wherein said substrate is part of sealed hybridization chamber and said method comprises disassembly of said hybridization chamber in the presence of disassembly buffer.

37. (Currently Amended) An apparatus for conducting a processing step of a hybridization reaction involving an array of biopolymers on the surface of a substrate, said apparatus comprising:

- (a) one or more devices according to claim 1,
- (b) one or more fluid reagent reservoirs in fluid communication with one or

more of said devices,

(c) a tilt mechanism for controlling the orientation of each of said devices,

(d) one or more pumps for controlling the flow of fluid reagents into each of said devices,

(e) at least one heat exchanger for controlling the temperature of said fluid reagents, and

(f) a portion of a lifting mechanism external to said devices wherein said lifting mechanism lifts said substrate out of contact with a fluid reagent in a controlled manner that preserves the integrity of the fluid reagent's meniscus at the atmosphere-fluid interface.

38. (Original) An apparatus according to claim 37 further comprising a transfer mechanism for moving a substrate to and from said devices.

39. (Original) An apparatus according to claim 37 further comprising a thermally insulating member around at least a portion of each of said devices.

40. (Original) A method for analyzing a liquid sample, said method comprising contacting said liquid sample with a surface of a substrate comprising a plurality of chemical compounds and processing said surface in an apparatus according to claim 37.

41. (Original) A method according to claim 40 further comprising exposing the array to a sample and reading the array.

42. (Original) A method comprising forwarding data representing a result obtained from a reading of an array exposed according to the method of claim 41.

43. (Original) A method according to claim 42 wherein the data is transmitted to a remote location.

44. (Original) A method comprising receiving data representing a result of an interrogation obtained by reading of an array exposed according to the method of claim 41.

45. (Currently Amended) A flow device comprising:

(a) a reaction chamber having an opening for insertion of a substrate into said reaction chamber, said substrate having a cover slide over a surface thereof wherein said surface comprises a plurality of biopolymers and

(b) a separator mechanism for separating said substrate surface and from said cover slide while in said reaction chamber without damage to said biopolymers on

said surface.

46. (Currently Amended) A flow device according to claim 45 wherein said separator mechanism comprises a pair of flexible members having a wedge member therebetween and disposed to insert between and separate said substrate surface and from said cover slide.

47. (New) A device for conducting processing steps on a substrate comprising an array of chemical compounds on a surface thereof, said device comprising:
a housing comprising a housing chamber configured to retain a fluid,
an opening in said housing adapted for insertion of a substrate having a surface comprising an array of chemical compounds into said housing chamber,
a fluid separation means for separating fluid from contact with said substrate in a controlled manner so that the integrity of the fluid's meniscus at the atmosphere-fluid interface is preserved,
at least one inlet in fluid communication with said housing chamber, and
at least one outlet in fluid communication with said housing chamber.

48. (New) The device of claim 12, wherein said separator mechanism is configured to separate said substrate from said cover slide to expose said surface of said substrate to fluid within said housing chamber.

49. (New) The flow device of claim 45, wherein said separator is configured to separate said substrate from said cover slide to expose said plurality of biopolymers to fluid within said housing chamber.

50. (New) The flow device of claim 46, wherein said wedge member is positioned to separate said substrate from said cover slide to expose said plurality of biopolymers to fluid within said housing chamber.

51. (New) The device of claim 12, wherein said separator mechanism is configured to part said substrate from said cover slide to expose said surface of said substrate to fluid within said housing chamber.

52. (New) The flow device of claim 45, wherein said separator is configured to part said substrate from said cover slide to expose said plurality of biopolymers to fluid within said housing chamber.

53. (New) The flow device of claim 46, wherein said wedge member is positioned to part said substrate from said cover slide to expose said plurality of biopolymers to fluid within said housing chamber.

54. (New) The device of claim 1, wherein said controlled manner provides for a constant velocity of flow of fluid reagent during its removal from the housing chamber.

55. (New) The device of claim 1, wherein said controlled manner provides for a constant velocity of flow of fluid reagent during its removal from the housing chamber, as measured by a velocity of the fluid reagent's meniscus.